

SANTA BARBARA COUNTY AIR POLLUTION CONTROL DISTRICT

**RULE 325 -- CRUDE OIL PRODUCTION AND SEPARATION**

*(Adopted 1/25/1994, revised 1/18/2001, and 7/19/2001)*

**A. Applicability**

This rule applies to equipment used in the production, gathering, storage, processing, and separation of crude oil and natural gas prior to custody transfer.

**B. Exemptions**

1. The provisions of Section D.1 of this rule shall not apply to any of the following:
  - a. Any tank battery, including wash tanks, produced water tanks and wastewater separators, for the purpose of processing crude oil having a vapor pressure at the initial storage tank entry point of less than 0.5 pounds per square inch absolute.
  - b. Any temporary tank battery, including wash tanks, produced water tanks and wastewater separators, holding or storing crude oil from any new crude oil production well, for a period of up to ninety (90) days following initial production from that well.
  - c. Any portable tank if all the following conditions are met:
    - 1) The tank is not used to increase the storage capacity of an existing tank battery.
    - 2) The tank is not located within 150 feet of a tank battery that is subject to the provisions of Section D.1.
    - 3) The tank is being used during maintenance activity at a tank battery or well and has not held or stored crude oil for more than 60 consecutive days, at that tank battery or well.
  - d. Tanks with capacities of 40,000 gallons or less of a producer who produces less than 400 barrels per day of crude oil from all operations within the County providing average daily throughput is less than 6,300 gallons per day (150 barrels), and the tank is equipped with a pressure relief device set in accordance with appropriate recommendations of the American Petroleum Institute, and the crude oil has a vapor pressure of less than 1.5 pounds per square inch absolute.

2. The provisions of Section D.1 of this rule shall not apply during maintenance operations on vapor recovery systems or tank batteries, including wash tanks, produced water tanks and wastewater separators, if the Air Pollution Control District is notified verbally by 4:30 P.M. the day prior to the maintenance operation and if the maintenance operation will take no more than 24 hours to complete.
3. The provisions of Sections D.1 and D.2 of this rule shall not apply to any wastewater tank if the reactive organic compound content of the liquid entering the tank is less than 5 milligrams per liter or the reactive organic compound emissions from the wastewater tank are measured to be less than 0.25 tons per year.
4. This rule shall not apply to components, as that term is defined in Rule 331 (Fugitive Emissions Inspection and Maintenance), which are subject to inspection and maintenance under Rule 331.
5. Sections D, E, F.4 and H of this rule shall not apply to pressure vessels or out of service tanks.
6. Sections D.1 and D.2 of this rule shall not apply to any wastewater tank which recovers less than 10 gallons per day of any petroleum product from liquid received from equipment which handles hydrocarbons with a maximum vapor pressure less than 0.5 pounds per square inch absolute if the operator verifies applicability of this exemption by maintaining weekly records of the amount of oil recovered.

## C. Definitions

See Rule 102 for definitions not restricted to interpretation of this rule.

**"Alternate test method":** A new method for testing that is not referenced in this rule or which involves major changes to a referenced test method.

**"Average daily throughput":** The quantity obtained by dividing the volume of crude oil which enters such tank in a calendar month by the number of days in that month.

**"Custody transfer":** The transfer of produced crude oil and/or condensate, after separation and/or treatment in production operations, from storage tanks or automatic transfer facilities to pipelines or any other form of transportation.

**"Heavy Oil":** Crude oil with American Petroleum Institute gravity less than twenty degrees.

**"HOST Test Method":** The "Test Method for Vapor Pressure of Reactive

Organic Compounds in Heavy Crude Oil Using Gas Chromatography", approved by the United States Environmental Protection Agency and any subsequent updates approved by the United States Environmental Protection Agency.

**"Leak":** A leak exists when one of the following conditions exists:

- a. a reading in excess of 10,000 ppm, as methane, above background, is obtained using an appropriate portable hydrocarbon analyzer and when sampling is performed according to the procedures specified in United States Environmental Protection Agency Method 21 - Appendix A, 40 CFR Section 3.2.1., or
- b. the dripping of liquid containing reactive organic compounds at a rate of more than 3 (three) drops per minute is observed.

A leak is not a gaseous emission from pressure relief devices on tanks or delivery vessels when the process pressure exceeds the limit specified for the device.

**"Light Oil":** Crude oil with American Petroleum Institute gravity greater than or equal to twenty degrees.

**"Liquid-tight":** The absence of visible indications of recent seepage of tank contents on the outside of the tank.

**"Out of service":** A tank 1) in which there is no liquid present, 2) which is configured to allow easy verification of such emptiness by inspection, and 3) for which no concentrations of gaseous organic compounds greater than 1000 (one thousand) ppmv can be detected outside the tank using United States Environmental Protection Agency Method 21.

**"Petroleum material":** Liquids resulting from petroleum production operations that contain more than five (5) milligrams per liter of reactive organic compound (ROC) material.

**"Portable tank":** A tank that can be moved from one location to another by attachment to a motor vehicle without having to be dismantled.

**"Pressure vessel":** Vessels rated, as indicated by an ASME pressure rating stamp, and operated to contain normal working pressures of at least 15 psig without vapor loss to the atmosphere.

**"Produced gas":** Organic compounds that are both 1) gaseous at standard temperature and pressure, and 2) associated with the production, gathering, separation or processing of crude oil or natural gas.

**"Produced water":** Water associated with the production, gathering, separation and processing of crude oil.

**"Tank"**: A container, constructed primarily of nonearthen materials, used for the purpose of storing or holding petroleum material, or for the purpose of separating water and/or gas from petroleum material.

**"Tank battery"**: Any tank, or any aggregation of tanks. An aggregation of tanks will be considered a tank battery only if the tanks are located so that no one tank is more than 150 feet from any other tank, edge to edge.

**"Vapor pressure"**: The vapor pressure determined as described in Section G.2 of this rule.

**"Vapor recovery system"**: Any reactive organic compound vapor control system which is designed to prevent the release or venting of reactive organic compound gases to the atmosphere under normal operating conditions.

**"Wash tank"**: Any tank that is not a pressure vessel and is used for the purpose of the primary separation of crude oil from petroleum material.

**"Wastewater separator"**: Any mechanical device used to separate crude oil and other material from produced water in petroleum production operations.

#### **D. Requirements for Storage Tanks**

1. No person shall place, hold or store any crude oil in any tank battery unless all storage tanks in the tank battery, including wash tanks, produced water tanks and wastewater separators, are equipped with a leak-free, properly installed, maintained, and operated vapor recovery system. The vapor disposal portion of the vapor recovery system shall consist of one of the following:
  - a. A system which directs all vapors to a fuel gas system, a sales gas system, underground injection or to a flare that combusts reactive organic compounds.
  - b. Any other system which processes all vapors and has a reactive organic compound vapor removal efficiency of at least 90% by weight.
2. Any tank exempt from Section D.1 of this rule pursuant to the provisions of Section B.1 shall comply with the following provisions:
  - a. All tanks shall be equipped with a solid roof and shall be maintained in good condition.

- b. All tanks shall be equipped with leak-free hatches and pressure-vacuum relief valves. Each pressure-vacuum relief valve shall be set in accordance with appropriate recommendations of the American Petroleum Institute.
- 3. Portable tanks used to store or hold crude oil shall be equipped with both a closed cover that is impermeable to reactive organic compound vapors and a pressure-vacuum valve set by the manufacturer or in accordance with appropriate recommendations of the American Petroleum Institute.
- 4. All tanks shall be maintained liquid-tight.

**E. Requirements for Produced Gas**

- 1. The emissions of produced gas shall be controlled at all times using a properly maintained and operated system that directs all produced gas, except gas used in a tank battery vapor recovery system, to one of the following:
  - a. A system handling gas for fuel, sale, or underground injection.
  - b. A flare that combusts reactive organic compounds,
  - c. A device with a reactive organic compound vapor removal efficiency of at least 90% by weight.
- 2. The provisions of Section E.1 shall not apply to wells which are undergoing routine maintenance.

**F. Requirements - Recordkeeping**

- 1. Any person wishing to operate pursuant to the provisions of Section B.1.a of this rule shall keep records to substantiate the applicability of that section. Such records shall include, for any crude oil, the vapor pressure in pounds per square inch absolute at the initial storage tank entry point. Records shall be made available to the Air Pollution Control Officer upon request.
- 2. Any person claiming an exemption pursuant to Section B.1.d or B.3 of this rule may be required to justify the exemption every twelve (12) months. Such justification shall be submitted to the Air Pollution Control Officer, in writing, upon request and shall include the results of an independent laboratory analysis.

3. Any person claiming an exemption pursuant to Section B.1.b or B.1.c for any tank shall maintain records indicating the number of days the tank has stored or held crude oil during the maintenance operation.
4. The operator shall maintain the following records annually:
  - a. The type of organic liquid in each tank
  - b. The maximum vapor pressure of the liquid, and
  - c. The results of the inspections required by Section H of this rule.
  - d. The American Petroleum Institute gravity of the oil in the tanks.
5. The operator shall maintain the records required by this rule in a readily accessible location for at least 5 years and shall make copies of the records available to the Control Officer upon oral or written request.
6. Any person claiming an idle tank exemption pursuant to Section B.5 of this rule shall keep records to substantiate the applicability of that section. Such records shall include annual measurement of gaseous organic compound concentrations in accordance with the definition herein of "out of service". Records shall be made available to the Air Pollution Control Officer upon request.

#### **G. Requirements - Test Methods**

1. The vapor removal efficiency in Sections D and E.1.c and the reactive organic compound emissions in Section B.3 shall be determined using California Air Resources Board Methods TP 202.1 and TP 203.1. The applicability of Methods TP 202.1 and TP 203.1 shall be determined as follows:
  - a. California Air Resources Board Method TP 202.1 applies to tanks receiving organic liquid by truck.
  - b. California Air Resources Board Method TP 203.1 applies to tanks receiving organic liquid other than by truck.
2. Vapor pressure of tank contents shall be determined as follows:
  - a. If the American Petroleum Institute gravity of the oil is greater than or equal to 20 degrees, then the vapor pressure shall be determined by measuring the Reid vapor pressure and converting the result to true vapor pressure at the tank's maximum liquid storage temperature.
    - 1) Reid vapor pressure shall be measured using Test Method for Vapor Pressure for Petroleum Products, American Society for Testing and Materials Method D 323-94.

- 2) Conversion shall be done using either the American Petroleum Institute nomograph attached hereto as Attachment A or the conversion calculation specified in the oil and gas section of the California Air Resources Board document entitled "Technical Guidance Document to the Criteria and Guidelines Regulation for AB 2588" dated August 1989 and attached hereto as Attachment B. If the American Petroleum Institute nomograph scales do not encompass the values necessary for its use, conversion shall be done using Attachment B.
    - b. If the American Petroleum Institute gravity of the oil is below 20 degrees, then the vapor pressure shall be determined using the HOST Test Method. For purposes of this rule, vapor pressure shall include the vapor pressure of all hydrocarbon compounds, i.e., hydrocarbon compounds containing from one to ten carbon atoms, present in the oil sample as determined by gas chromatography.
    - c. The American Petroleum Institute gravity shall be determined according to American Society for Testing and Materials Method D287-82.
    - d. Separate samples shall be taken for American Petroleum Institute gravity and vapor pressure determinations. Sampling for American Petroleum Institute gravity shall be according to American Society for Testing and Materials Method D 4057-95.
    - e. An alternative test method may be used if it provides the same result for a given sample and is approved in advance by the United States Environmental Protection Agency and the California Air Resources Board for the purpose of determining vapor pressure of liquids of the type subject to this rule.
  3. The reactive organic compound content of liquid in milligrams per liter shall be determined by purge and trap (United States Environmental Protection Agency Test Method 5030B or 5035) and analysis with gas chromatography by United States Environmental Protection Agency Test Method 8015B, modified for the analysis of all aliphatic and aromatic hydrocarbons, with calibration to include all hydrocarbon compounds containing from three to ten carbon atoms. Stock standards shall be prepared with appropriate gasoline fluids or other appropriate standards.

## **H. Requirements - Inspection**

The operator shall visually inspect any roof and internal floating cover and its closures and seals at least once every 5 years, and shall perform a complete inspection of any roof or cover whenever the tank is emptied for non-operational reasons or at least every 5 years, whichever is more frequent.

## **I. Compliance Schedule**

### **1. Light Oil Compliance Schedule.**

- a. All operations in which this rule applies shall be in full compliance no later than July 25, 1995 except for existing wastewater tanks which must be in full compliance no later than July 25, 1996.
- b. Before any person installs emission control equipment for an existing tank pursuant to requirements of this rule, they shall submit an application for an Authority to Construct (ATC) no later than July 24, 1994, except for the installation of emission control equipment for existing wastewater tanks in which case they shall submit an application for an ATC no later than July 25, 1995. However, any person who elects to replace a tank that requires modification under this rule shall submit an ATC application no later than August 23, 1994.
- c. Any owner or operator claiming a Section B.1, B.2, B.3, or B.5 exemption shall obtain District-approved exempt status according to the following schedule.
  - 1). For existing tanks, within 90 days after January 25, 1994.
  - 2). For proposed tanks, upon application for an ATC.

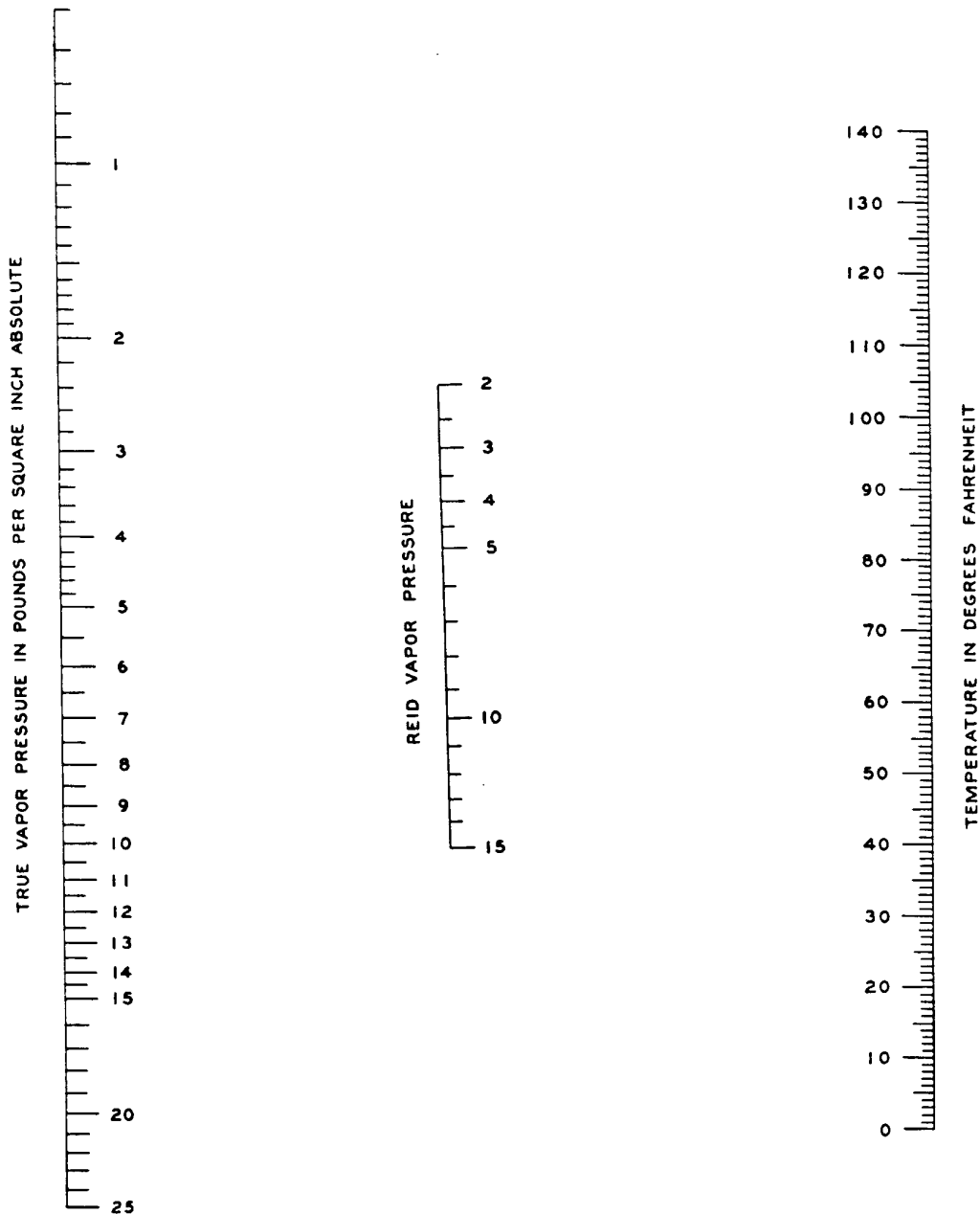
### **2. Heavy Oil Compliance Schedule.**

- a. All operations in which this rule applies shall be in full compliance no later than April 18, 2002.
- b. Before any person installs emission control equipment for an existing tank pursuant to requirements of this rule, they shall submit an application for an Authority to Construct no later than April 18, 2001. However, any person who elects to replace a tank that requires modification under this rule shall submit an Authority to Construct application no later than May 18, 2001.
- c. Any owner or operator claiming a Section B.1, B.2, B.3, or B.5 exemption shall obtain District-approved exempt status according to the following schedule.



- 1). For existing tanks, within 90 days after rule adoption, except for a B.5. exemption if previously submitted.
- 2). For proposed tanks, upon application for an Authority to Construct.

**Attachment A**  
**American Petroleum Institute Nomograph**  
**(API 2518)**



**True Vapor Pressures (*P*) of Crude Oils (2 psi to 15 psi RVP)**

**Attachment B**  
**Technical Guidance Document to the Criteria and Guidelines Regulation for AB**  
**2588**  
**(Excerpt from pages 102, 103, and 114)**

5. True Vapor Pressure (TVP)

True vapor pressure, the equilibrium partial pressure exerted by a volatile liquid, is perhaps the most difficult term in the breathing loss equation to calculate. A nomograph (included in Appendix E) relates TVP to both the Reid Vapor Pressure (RVP) and the storage temperature ( $T_s$ ). RVP is the absolute vapor pressure of volatile crude oil and nonviscous petroleum liquids. Numerically, the relationship between TVP, RVP, and temperature can be expressed by the following equation:

$$TVP = (RVP)e^{C_o(IRTEMP-ITEMP)} \quad (25)$$

Where:

$$\begin{aligned} C_o &= \text{Constant dependent upon the value of RVP} \\ ITEMP &= (1/559.69 \text{ } ^\circ\text{R}) \\ IRTEMP &= (1/(T_s + 459.69 \text{ } ^\circ\text{R})) \\ T_s &= \text{Temperature of the stored fluid} \end{aligned}$$

The value of the constant term  $C_o$  depends on the given value of RVP.

Values of  $C_o$  for different RVP numbers are tabulated in Appendix C. It should be noted, however, that an error was discovered in the API nomograph calculated values of TVP so that the RVP was not equal to TVP at 100°F as was expected given the general definition of RVP. Using linear regression techniques, correction factors ( $C_F$ ) were developed and should be added to the calculation values of TVP in order to obtain reasonable TVP numbers. The relationship between the three values is given as follows:

$$\text{Corrected TVP} = \text{Calculated TVP} + C_F \quad (26)$$

The correction factor was found to be dependent upon RVP according to the following equations:

If  $RVP < 3$ ,

$$C_F = (0.04) \times (RVP) + 0.1 \quad (27)$$

If  $RVP > 3$ ,

$$C_F = e^{[(2.3452061 \log (RVP)) - 4.132622]} \quad (28)$$

**TABLE C-3 VALUES OF  $C_o$  FOR DIFFERENT RVP NUMBERS**

RVP	$C_o$
0<RVP<2	-6622.5
2<RVP<3	-6439.2
RVP = 3	-6255.9
3<RVP<4	-6212.1
RVP = 4	-6169.2
4<RVP<5	-6177.9
RVP = 5	-6186.5
5<RVP<6	-6220.4
RVP = 6	-6254.3
6<RVP<7	-6182.1
RVP = 7	-6109.8
7<RVP<8	-6238.9
RVP = 8	-6367.9
8<RVP<9	-6477.5
RVP = 9	-6587.9
9<RVP<10	-6910.5
RVP = 10	-7234.0
10<RVP<15	-8178.0
RVP>15	-9123.2